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AUTHOR Calvert, Sandra L.; Scott, M. Catherine
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ABSTRACT

Children's temporal comprehension was assessed after viewing a television program containing flashbacks that shifted the events to much earlier times. Flashbacks were marked or not marked with sound effects, and time relations were represented with either dreamy dissolves or abrupt camera cuts. A total of 64 children, equally distributed by sex and by grades kindergarten and first versus fourth and fifth, participated in individual viewing sessions. After viewing, children sequenced picture sets to assess temporal integration of the plot line and answered questions to assess comprehension of the flashbacks. Results indicated that young children understood temporal concepts best after viewing camera dissolves, but older boys understood concepts of real time best after viewing camera cuts. The results suggest that formal features differentially activate mental skills, depending on children's age and the complexity of the comprehension task. (Author/RH)

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Television Production Feature Effects on Children's Comprehension of Time

Sandra L. Calvert

and

M. Catherine Scott

Children and Technology Project

Department of Child Development and Family Relations

University of North Carolina at Greensboro

Greensboro, North Carolina 27412

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Running Head: TELEVISION TIME COMPREHENSION

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Abstract

Children's temporal comprehension was assessed after viewing a television program containing flashbacks that shifted the events to much earlier times. Flashbacks were marked or not marked with sound effects, and time relations were represented with either dreamy dissolves or abrupt camera cuts. Sixty-four children, equally distributed by sex and by grades kindergarten and first versus fourth and fifth, participated in individual viewing sessions. After viewing, children sequenced picture sets to assess temporal integration of the plot line and answered questions to assess comprehension of the flashbacks. Results indicated that young children understood temporal concepts best after viewing camera dissolves, but older boys understood concepts of real time best after viewing camera cuts. The results suggest that formal features differentially activate mental skills, depending on children's age and the complexity of the comprehension task.

Television Production Feature Effects on Children's Comprehension of Time

Television allows a unique perceptual experience that is not possible in real-life. Through the use of media conventions like flashbacks, characters violate major time boundaries, and events are presented in an illogical temporal order.

Dreamy dissolves, in which the edges of the picture become shady or fuzzy, are more likely to mark major shifts in time than are camera cuts, perhaps because cuts call upon viewers to infer changes in time and place whereas dissolves place more visual emphasis on those transitions. Auditory features like sound effects can add additional emphasis by highlighting those transitions, just as a spotlight can focus an audiences' attention on a specific actor in a play (Wright & Huston, 1983).

The purpose of this study was to examine developmental differences in children's understanding of time relations marked by different visual and auditory formal production features. We expected younger children to understand temporal relations better when dreamy dissolves or sound effects marked flashbacks and older children to better understand shifts marked by camera cuts.

Method

Television Program and Treatment Conditions

A 21-minute color, animated episode of "Tarzan: Lord of the Jungle," portrayed a cruel huntress who learned that all animals have a right to be free. This program was selected for study because two flashback sequences shifted the scenes to events that occurred at much earlier times. The first flashback lasted 40 seconds and showed Tarzan meeting a Golden Lion many years before when the lion was a baby cub. The second flashback lasted 7 seconds and repeated an earlier program event where the huntress called an animal a "stupid beast." At the scene transitions before and after the flashbacks, four treatment conditions were created by crossing two levels of sound effects (presence vs. absence) with two levels of visual features (camera cut vs. dreamy dissolve).

Subjects

Sixty-four children, equally distributed by sex and by grades kindergarten and first (M = 6 years, 8 months) versus fourth and fifth (M = 10 years, 6 months), were randomly assigned within grade and sex groups to one of the four treatment conditions.

Visual Attention

Individual viewing sessions were videotaped and

later scored to derive three attention scores for each child. Recruit attention scores measured the probability that children who were not looking at the television program immediately before the first flashback would look back at the program within 5 seconds after the onset of treatment. Maintain attention scores measured the probability that children who were already looking at the onset of the first flashback would continue to look for at least 5 seconds after the onset of treatment. Duration of attention measured the percent of time that children looked at the first flashback. Interobserver reliability was 93% for recruit and maintain scores and 98% for duration of attention to the flashback.

Comprehension of Time

After viewing, children ordered one set of events photographed from the television program according to the order that events occurred on the television program (i.e., television time) and then according to the order that those events would actually occur in real time. This set consisted of two pictures taken from the flashback segment and four pictures taken from other program sections. Following procedures developed by Wright et al. (1984), picture sequence scores were

calculated for each child by comparing the child's picture order to its correct absolute position and to the number of correctly sequenced adjacent pairs of pictures. The maximum possible score was 20.

Children were also shown each of the two flashbacks that were part of their treatment condition. Children were asked if anything in that part of the story happened in the past. If children said yes, the experimenter asked how they knew. Finally, children were asked the relation of two pictures of the golden lion when he was a cub versus an adult.

Results

Visual Attention

Children who heard sound effects were expected to either begin a look (i.e., to be recruited) or to continue a look in progress (i.e., to be maintained) more than children who did not hear sound effects. Immediately before the onset of the first flashback, 91% of the children in no sound effect conditions were already looking whereas only 63% of the children in sound effect conditions were looking. As expected, sound effect treatments gained children's attention (63% to 91%) whereas children in no sound effect conditions showed little change (91% to 88%). Put another way, sound effects made both groups essentially the same in

attention at the onset of the first flashback. The children who were not recruited or maintained by sound effects were young girls.

The next question concerned whether sound effects would increase young children's duration of attention to the entire 40-second flashback. Analysis of variance was performed on duration of attention scores using grade (2) x sex (2) x sound effect level (2) x visual treatment (2) as the independent measures.

A grade by sex by sound effect level interaction occurred in duration of attention to the first flashback, F (1,48) = 5.70, $p < .05$. As seen in Table 1, Duncan's multiple-range follow-up test revealed that young boys who heard sound effects attended

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Insert Table 1 about here

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significantly longer to the first flashback than did young girls who heard sound effects ($p < .05$). There were no significant attentional differences within the older age group.

Comprehension of Time

The number of items sequenced correctly according to television time and real time were analyzed, in turn,

by a 2 (visual feature) by 2 (sound effect) by 2 (grade) by 2 (sex) analysis of variance. Sequencing items according to television time required children to put events in order just like they were presented on television. The four-factor ANOVA computed on television-time sequence scores yielded only a main effect for grade, F (1,48) = 11.51, $p < .001$. Older children sequenced more pictures correctly than did younger children (15.31 vs. 11.91).

Sequencing items according to real time required children to put events in order as they would occur in real life. The four factor ANOVA on real-time sequencing scores yielded a visual treatment by grade by sex interaction, F (1,48) = 4.13, $p < .05$. As seen in Figure 1, older boys understood conceptions of real time

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Insert Figure 1 about here

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better after seeing camera cuts, but girls did not. There were no significant differences within the younger age group.

When children were reshown the flashbacks, older children were more likely to understand that a time change had occurred than were younger children for both the first, χ^2 (1) = 4.15, $p < .05$, and the second

flashbacks, χ^2 (1) = 20.44, $p < .001$. Only 47% of the younger children answered correctly for the first flashback and 44% answered correctly for the second flashback. By contrast, older children answered correctly 72% and 91%, respectively.

When children said that a change in time had occurred, older children were more likely to include formal features as part of their rationale (e.g., "the picture spinned") than were younger children for both the first (38% vs. 6%) and second (47% vs. 9%) flashbacks. Young children who answered correctly usually gave only a content rationale (e.g., "he was big, and then he was little").

When we asked the relation of the two pictures of the lion when he was an adult and a baby cub, 69% of the younger and 81% of the older children answered correctly. As expected, both age groups performed better in dissolve (M = 75%) than in cut conditions (M = 25%), χ^2 (1) = 4.08, $p < .05$.

Discussion

Both age groups used formal features as guides to attention or comprehension of television content. Young children, especially boys, attended selectively to content after hearing sound effects, but attention alone

was insufficient to insure that comprehension of flashbacks would increase.

Understanding an abstract concept like flashbacks developed gradually with age. Initially, dreamy camera dissolves that clearly indicated a time shift increased comprehension. Whereas young children could understand very concrete temporal concepts that were represented by dissolves, older children could also verbalize that dissolves indicated a change in time. The most complex task, resequencing program events according to real-time, was facilitated when older boys saw camera cuts.

The results suggest that age-related improvements in children's comprehension of time may reflect both their growing knowledge about how formal features are used to represent time, and their ability to use features to guide their comprehension. While processing of television content is often perceived as a lazy cognitive activity, children exert mental effort to comprehend complex tasks when they are challenged to do so.

References

Wright, J.C. & Huston, A.C. (1983). A matter of form: Potentials of television for young viewers. American Psychologist, 35, 835-843.

Wright, J.C., Huston, A.C., Ross, R.P., Calvert, S.L., Rollandeli, D., Weeks, L.A., Raessi, P., & Potts, R. (1984). Pace and continuity of television programs: Effects on children's attention and comprehension. Developmental Psychology, 20, 653-666.

Table 1.

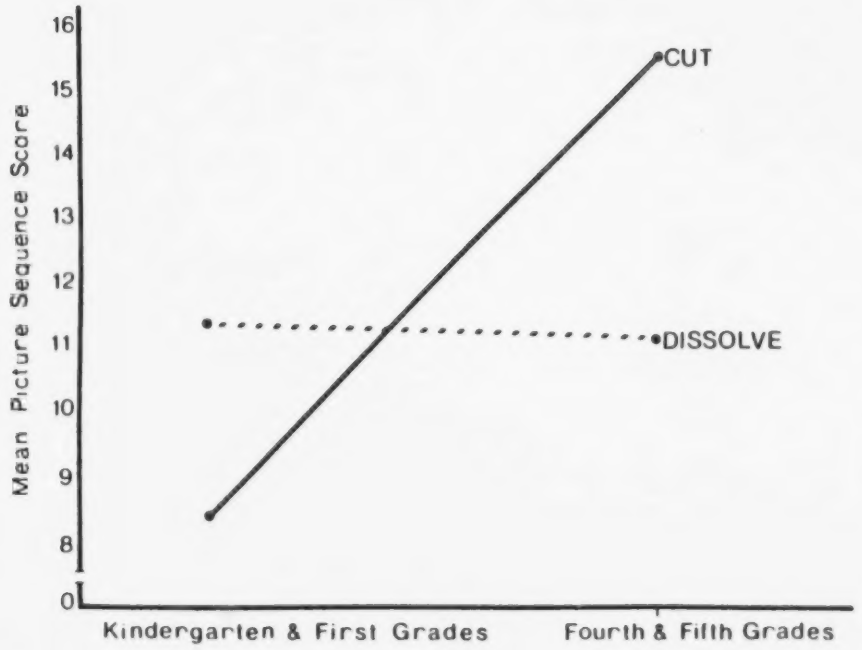
Mean percent of visual attention to the first flashback as a function of grade and sex.

	Kindergarten and First Grades		Fourth and Fifth Grades	
	No Sound	Sound	No Sound	Sound
Boys	77%	90% [a]	87%	85%
Girls	88%	70% [b]	83%	92%

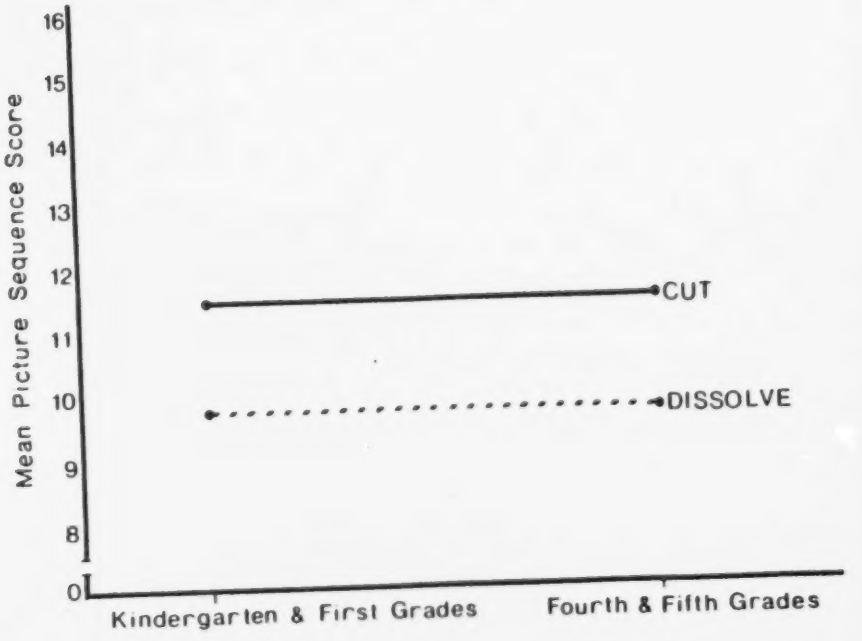
Values with different letter superscripts are significantly different at $p < .05$. Contrasts were performed within grades.

Figure Caption

Figure 1. Mean number of items sequenced correctly according to real time as a function of grade and sex.


Mean Picture Sequence Score
16
15
14
13
12
11
10
9
8
0
CUT
DISSOLVE
Kindergarten & First Grades
Fourth & Fifth Grades

BOYS


Mean Picture Sequence Score
16
15
14
13
12
11
10
9
8
0
CUT
DISSOLVE
Kindergarten & First Grades
Fourth & Fifth Grades

GIRLS